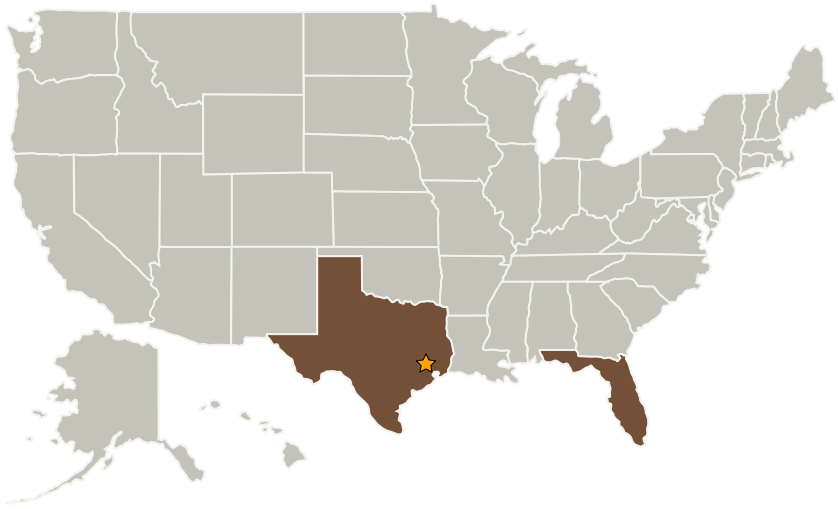
Demonstration of Silicon/Carbon Nanostructured Electrodes in Li-Ion Batteries, Phase I

Completed Technology Project (2006 - 2007)

Project Introduction

The energy generation and storage for modern-day sensor networks, communications, and electronics presents a variety of unique challenges. To achieve the long-duration missions away from Earth as outlined in the Vision for Human Exploration in Space, these energy storage systems will need to undergo a dramatic increase in their specific energy densities. Recently, Mainstream has made startling advances in the area of high energy-density batteries using carbon nanotube (CNT) electrodes. However, theory suggests that silicon actually possesses an intercalation capacity that is an order of magnitude above that of carbon. If this is able to be translated into added capacity, it would truly revolutionize Li-ion electrochemistry and energy-storage technologies in general. The Universities Space Research Association has recently developed a process of growing silicon nanorods and has agreed to team with Mainstream for this Phase I STTR effort. This Phase I focuses on developing and testing electrodes comprised of both silicon and carbon nanostructures in Li-ion batteries. Because the basic battery chemistry will not be affected, safety will not be compromised.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Mainstream Engineering Corporation	Supporting Organization	Industry	Rockledge, Florida

Primary U.S. Work Locations	
Florida	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.1 Electrochemical: Batteries